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Assessment of diabetes mellitus prevalence among outdoor patient departments in a tertiary care hospital: A retrospective cross sectional study

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Abstract---Diabetes mellitus, affecting the multisystem in human body, is primarily characterized by chronic hyperglycemia. The impaired glucose level may be due either of insulin resistance or insulin secretion that produces micro vascular as well as macro vascular complications in human beings. Diabetes is characterized by excessive thirst, extreme hunger, frequent urination and weight loss. Pre-screening to assess random blood glucose level, before any minor or major procedure is of utmost important for better functional outcome of patients. The aim of this retrospective study was to assess the level of awareness and screening amongst patient visiting in outdoor and indoor department in a tertiary level hospital. The patients which were sent for random blood sugar testing were included in this study from a period of March 2019 to February 2020. Data of random blood sugar level of 3750 patients were scrutinized and collected from 75000 records and analyzed by Excel software for correlation and association. Keeping statistical significance of $P < 0.05$, the prevalence of diabetes mellitus was found to be 33.4% in tested random blood sugar levels. This study has shown more prevalence in male ($m=2325$, 62%) with higher incidence in age group in 41-60 years (48.4%). This study has also shown that this non-

communicable disease is more prevalent amongst urban (66%) than rural population. Diabetes mellitus prevalence amongst given population and gender dominance will guide the physicians/surgeons to prevent any further complications. The pilot project may be launched to create awareness about various life style diseases among the targeted population.

Keywords---diabetes, non-communicable, micro vascular, hyperglycemia.

Introduction

Egyptian manuscript has shown Diabetes mellitus as one the first described diseases. The term “diabetes” or “to pass through” was first used in 230 BCE by Greek Apollonius of Memphis. Indian physicians Sushruta and Charaka in 400-500 CE described two types of diabetes among population. In industrialized world, the non-communicable diseases has increased manifold due to increasing sedentary life style of population. Amongst chronic diseases, Diabetes Mellitus has surpassed other chronic diseases. This chronic metabolic disease may be due to either defects in insulin secretion, insulin action or both, leading to prolonged hyperglycemia in body.⁽¹⁾ These causes of hyperglycemia may occurred separately or coexist in same patient. This chronic disorder affects all age groups and its micro vascular as well as macro vascular complications are main cause of morbidity and mortality all over the world. Its etiopathogenesis is multifactorial, which leads to development of this chronic disorder among human beings. It may occur due to either autoimmune destruction or other abnormalities in pancreatic B cells.^(2,3) It is mainly classified in to two types like (1) Type 1 diabetes (2) Type 2 diabetes. A third form of its called gestational diabetes, occurs in pregnant women without a previous history of diabetes develop high blood sugar levels. As of 2019, an estimated 463 million people had diabetes worldwide (8.8% of adult population).⁽³⁾ Accounting for shifting of age structure, prevalence of it has doubled 8.8% from 4.7% from year 1980 to 2017. The increase in rate in developing countries is due to trend of urbanization, increasingly sedentary life style and western style diet. The global number of diabetes might increase by 48% between 2017 and 2045. According to International Diabetes federation (IDF) in 2017 diabetes has resulted in approximately 4.0 million deaths worldwide and is the 7th leading cause of death globally.⁽⁴⁾ In US average medical expenditures among people with diabetes are about 2.3 times higher than non-diabetic. In type 1 diabetes, called as insulin dependent diabetes mellitus (IDDM) there is impairment of insulin secretion by b-cells of pancreas, while in type 2, known as non-insulin dependent diabetes mellitus, has decreased sensitivity to of tissues to the secreted insulin.⁽⁵⁾ The prevalence of type 1 diabetes is 10% all over the world and is mainly seen in age group of 4-5 years or in their early adulthood. Type 2 diabetes accounts for 90% of these cases and is the predominant type of diabetes mellitus.^(6, 7) World Health Organization has reported 32 million cases of diabetes in India, which is the highest incidence in the worldwide.⁽³⁾ Diabetes mellitus cases are increasing at alarming rate.⁽⁸⁾ Increasing cases of diabetes has led to epidemic and making India as diabetes capital of world. There are various predisposing factors which has been associated to cause diabetes. Among these,

obesity, life style changes due to urbanization, and high familial aggregation are major factors.⁽⁹⁾ Due to advancements in science and technology, our communication system has improved a lot leading to increased prevalence of sedentary life style.⁽¹⁰⁾ These advancements has shaped our modern society to sedentary lifestyle with increase in potential burden of diabetes and uncertain future. There were international efforts like St. Vincent Declaration, to improve care accorded to diabetes patients.^(9,11) The patients with neuropathic symptoms like numbness or tingling in feet or hands are twice as likely to be unemployed as those without symptoms. Excessive thirst and hunger, frequent urination, are common symptoms of hyperglycemia. Chronic hyperglycemia, has led to impairment of growth and susceptibility to deadly infections, or may be associated with weight loss or blurred vision.⁽¹¹⁾ It can also present as a life threatening complications. Diabetes mellitus affects the multisystem of body with its complications like retinopathy, nephropathy and peripheral neuropathy with cardiovascular symptoms, and other genitourinary with gastrointestinal dysfunctions. It has deadly complications mainly loss of vision, renal failure, and non-healing foot ulcers leading to amputations of affected limb.⁽¹²⁾ Opportunistic diseases of oral cavity are common among hyperglycemic patients with periodontal diseases. Salivary gland dysfunction is common among these diabetes patients.

Diabetes Mellitus is also associated with oral cavity diseases like gingivitis, periodontitis. This also affects the salivary glands resulting in its dysfunction, and with change in composition of saliva as well as in its flow. ⁽¹³⁾ In patients with diabetes mellitus overall immunity is lowered and there is high incidence of oral as well as opportunistic fungal patients.⁽¹⁴⁾ Patients of diabetes mellitus had increased physiological stress and hence various complications like dental carries, neurosensory disorders and delayed wound healing may be seen in these cases. These complication may lead to other life threatening diseases. These patients may be having prolonged hyperglycemia before presenting as a case of full blown diabetes. ⁽¹⁵⁾ These impaired glucose levels has led to foundation of various unpredictable complications. Altered immune response and prolonged hyperglycemia may cause increased secretion of pro-inflammatory markers like tumor necrosis factor Alfa and prostaglandin E. These altered condition can lead to impaired polymorph nuclear leukocyte production, causing bacterial persistence and accumulation of advanced glycation end products in tissues. These factors in diabetes patients lead to decline in innate immunity and hence, delayed vascularization, decreased blood flow and growth factor production. ⁽¹⁶⁾ Outcome in these patients follow a hyperglycemia dependent predictable sequential progression. Diabetes Mellitus is more common in the fourth to fifth decade of life with more prevalence in in adults aged more than 25 years. In general population, its prevalence is low, but higher rates are seen in adults aged more than 40 years.⁽¹⁷⁾ Diabetes mellitus has male to female ratio of 2.5: 1.0. ⁽¹⁸⁾ Early screening and diagnosing in middle aged adults is need of hour and preventing deadly complications.⁽¹⁹⁾

These patients may present as a considerable load to outdoor departments. Many of these may be associated with end complications and seen in outdoor consultations. Its assessment of prevalence among patients visiting various OPD in a tertiary hospital help us to find the prevalent burden of patients load and

taking necessary precautions to manage and prevent complications. These patients are associated with high incidence of infections and implant failures. We have planned to conduct this study to create awareness as well as assessment of prevalence of this diseases among patients visiting OPD. This study will help us to identify as well as manage these patients and prevent further life threatening complications. The aim of the study was to assess the prevalence of diabetes mellitus in patients visiting various OPD's of a tertiary hospital.

Material and Methods

Study design: This was a retrospective cross sectional study conducted in tertiary hospital and conducted by three peoples. (Researcher, supervisor and reviewing expert). Sampling method: Simple random sampling of healthy patient was done and who had been tested for blood sugar levels were included in study. This retrospective data *obtained* from the institution was ethically approved vide No.(TRG).EC/NEW/INST/2019/997/27356

Duration of study: One year (March 2019 to February 2020)

Sampling

We have reviewed and analyzed 75000 cases from our own hospital record, which were referred for random blood sugar tests to check the status of glucose levels in their blood. All data related to patients were reviewed and arranged for further analysis. Out of these cases, using a simple random sampling, n= 3750 were selected for analysis taking a cut off value of blood sugar 150 mg/dl and above. As per WHO criteria normal blood sugar level is between 80-150 mg/dl. All patient's blood sugar data were cross verified by another researcher.

Data analysis

The data of both normal and diabetes patients, who underwent blood glucose tests to rule out impaired glucose levels were included in study. Incomplete data was excluded from study. All verified data was converted to tabulation and Excel Software were used to analyze the data. Descriptive analysis was done in terms of frequencies and percentage. Independent variables are ethnicity, age, gender, and frequency while dependent variables were diabetes mellitus, blood sugar levels in this study.

Results and Discussion

In this study, 3750 patients' blood sugar levels data were included for descriptive and inferential analysis using Excel Software. Categorical measurements were presented as percentage (%) and level of significance was determined as probability value of $P < 0.05$. All values which were < 0.05 were considered statistically significant.

In our study, the inference of random blood sugar levels shown that its incidence was 8.2% in age of 1-20 years and 21.1% in age of 21-40 years. In age group of 41-60 years it was 48.3% and 22.4% in age more than 60 years. (Table/Figure-2)

The data analysis of blood glucose reports showed that patients below 20 years were having normal glucose levels, while in age group of 21-40 years, about 21% were having borderline glucose levels. Significant cases of diabetes mellitus comprising about 42% of all cases were seen in group of 41-60 years. In elderly population above 60 years about 35 % of patients were diabetic and remaining patients were non-diabetic. This analysis showed that it is more prevalent in 41-60 years age group and P- value of 0.002 is statistically significant. Random blood sugar level test showed that there were 62% males (n=2325) and 38% (n=1425) were females. (Table/Figure-1) These results has shown that diabetes is more prevalent in males. Out of these 2325 male patients, 36% have reported with diabetes and rest of 64% were presented with normal condition. Similarly, in 1425 females, there were 30% females that has been reported with diabetes and rest about 70% of these were normal. P value was $p=0.001$, which was statistically significant.

As per WHO criteria, 80-150 mg/dl levels of random blood sugar was considered as normal and level more than 150 mg/dl was taken as a diabetes mellitus. The prevalence of diabetes with cut off random blood sugar 150 mg/dl level was shown that 34.2% are diabetic and about 65.8% are non-diabetic or considered as normal. It is statistically significant. ($p=0.001$) In our study, Clinic prevalence of random blood sugar was 45% from medicine, 35 % from surgical and 15% from geriatric and remaining were from gynecology clinics. According to data in our study, the prevalence of diabetes was 55% in medicine, 45% in surgical and 25% in geriatrics while in gynecology 15% were reported diabetes. (Table/Figure-2) This data shows that higher prevalence of diabetes were seen in medicine followed by in surgical branches. The probability value of $p=0.001$ had shown that this is statistically significant.

Metabolic disorders like diabetes mellitus are multifactorial in nature and are associated with high levels of hyperglycemia before being diagnosed as case of full blown diabetes. Diabetes mellitus affects the carbohydrate, lipid and protein metabolism in human as well as in animals. ⁽²⁰⁾ In India, currently the prevalence of diabetes mellitus is about 65 million cases and gaining status of epidemic. ⁽²⁰⁾ The cases of diabetes has high prevalence in India than nearby western countries and it has been increasing on alarming rate. ⁽²¹⁾ Long term hyperglycemia affects all tissues and bodily organs by producing factors that lead to ischemia, increased reactive oxygen species production and inflammation. These has initiated bodily damaging processes with deadly implications. Due to ongoing hyperglycemia, various complications are expected in surgical and medicine patients. The underlying cause may be insulin resistance, dyslipidemia, and altered immune system, that has led to various other diseases and these patients are more prone to secondary infections. These can be prevented by using colour Doppler ultrasound to detect any ongoing atherosclerotic changes in vessels. Prolonged and poorly controlled hyperglycemia has been associated with poor functional outcome in surgical as well as in medicine patients. The various markers of immune response like CD-68, HLA-DR, LCA and immunohistochemistry can be used for detecting cellular changes. The altered oxidant levels and impaired immune response leading to various opportunistic infections. ⁽²¹⁾

In oral cavity, hypo salivation may be due to diabetic neuropathy which may cause to dental caries in chronic hyperglycemic patients.⁽²²⁾ Similarly in orthopedic and surgical patients poor glycemic control can cause poor wound healing with chronic sinus formation. Prolonged diabetes patients with associated neuropathy may suffer from various burns or decubitus ulcers. These patients may sometimes may have acquired amputations of affected limb. Altered glycemic control can also lead to wound dehiscence and many psychological manifestations.⁽²³⁾

In this study, according to age pattern of disease, has showed that it affects peoples of all age groups, but peak incidence has been observed in age group of 41-60 years. These results are in concordance with a study conducted by American population which has shown mean age of 52.8±12.7 years.⁽²⁴⁾ Chronic hyperglycemia in increasing age is due to impaired insulin secretion as well as its action. These altered lipid metabolism patients can suffer from various micro vascular complications.

Our study has shown that middle age men are at significant risk of developing diabetes than women in populations. According to different patterns of obesity prevalent in males and females, males present as apple shaped while women present with pear shaped obesity. The less prevalence in women may be due protective effect of hormone estrogen in females and men without diabetes are generally more insulin resistance than women.⁽²⁵⁾

Gender preponderance of diabetes in our study ($p < 0.05$) was in concordance Scotland study, which has shown prevalence of diabetes is increasingly more in males.^(26,27) Impaired pancreatic function and increased insulin resistance with increase in age is associated with prolonged diabetes.

Our institute being a tertiary care level hospital, 35 % of total patients were diabetes. Among these patients about 65% was of urban and 35% were of rural area. (Table/Figure-4) Our study has shown the prevalence of diabetes of 42% which was in concordance with study conducted by Yang et al in which 34.4% of patients were reported as diabetes.^(28,29) Early detection and prompt treatment of cases can lead to better glycemic control and can produce better outcome in these cases.

Our study has shown that more number of patients were reported in medicine clinics than surgical clinics and more prevalence of diabetes in medicine clinic than the surgical clinics. The gynecology and geriatric clinics has shown less number as well as less prevalence of diabetes cases. It is well known fact that, creating awareness among population is the only tool to prevent from these non-communicable diseases. The Government of India has launched various programmes for non-communicable diseases, to deal with life style diseases and preventing to spread epidemics. The observations in this study will help the treating physicians and surgeons to be prepared with factors and findings for creating awareness and treatment for betterment of these patients.

Conclusion

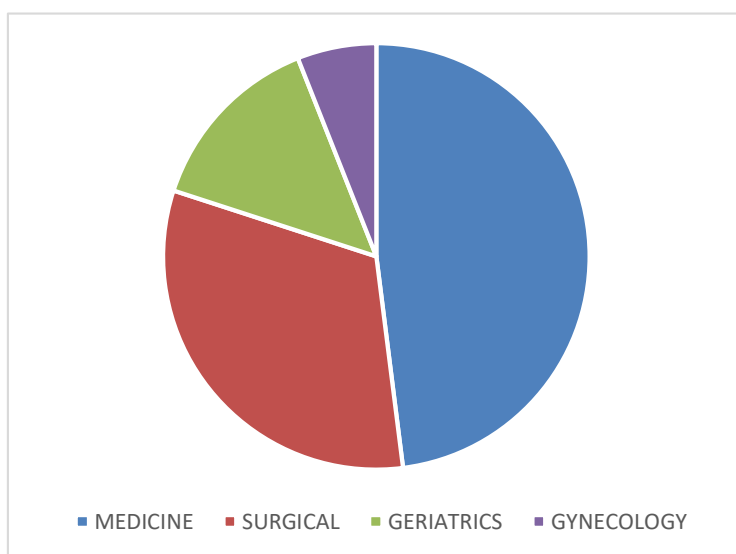
Our study has reported the prevalence of diabetes mellitus condition in 41-60 years with higher incidence in males, primarily reported in medicine clinic. Routine screening for glucose testing with pre-monitoring of diabetes condition is the key factor to prevent deadly complications among these patients.

Table/Figure-1: Showing gender prevalence

Sex of patients	Number of patients
Male	2325
Female	1425

Table/ Figure-2: showing age prevalence of Diabetes mellitus

Sr no.	Age group (in years)	Percentage
1	1-20	8.4 (315)
2	21-40	21.2 (795)
3	41-60	48.3 (1815)
4	60 and above	22 (825)



Table/Graph -3: showing specialty wise prevalence of diabetes mellitus

Table/ Figure-3: Showing specialty wise prevalence of diabetes mellitus

Sr.no	Specialty	Total percentage	Relevant frequency
1	Medicine	48 (1800)	55
2	Surgical	32 (1200)	45
3	Geriatrics	14 (525)	25
4	Gynecology	6 (225)	15

Table /Figure -4: showing demographic presentation

Urban	66 (2475)
Rural	34 (1275)

Conflicts of interest: nil

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